

**REMARKS**

The present application includes pending claims 20-53. Claims 20 and 37 are independent claims. Claims 1-19 have been previously cancelled and claim 35 is cancelled in this amendment. Claims 20-29, 31, 37-44, 46 and 48 have been amended to further clarify the claim language. The Applicant points out that the amendments are supported by at least pages 2-3, 8, and Figs. 2-4B of the specification. The Applicant respectfully submits that the claims define patentable subject matter.

Claims 21-28 are objected for missing the dependency on preceding claim 20 as listed in the previous amendment.

Claims 20-53 have been rejected under 35 U.S.C. § 112, first paragraph for allegedly failing to comply with the enablement requirement.

Claims 20-53 have been rejected under 35 U.S.C. § 101 for allegedly being directed to non-statutory subject matter.

Claims 20-53 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Martin et al. ("Unitary ESPRIT: How to Obtain Increased Estimation Accuracy with a Reduced Computational Burden", hereinafter Martin) in view of the admitted prior art (Brief Description of Related Art on page 1 of the present application, hereinafter AAPA).

The Applicant respectfully traverses these rejections at least for the reasons previously set forth during prosecution and at least based on the following remarks.

**I. Objections to Claims 21-28**

Claims 21-28 are objected for missing the dependency on preceding claim 20. The Applicant has corrected the missing claim dependency in claims 21-28. The Applicant respectfully requests the objection to claims 21-28 be withdrawn.

**II. Claim Rejections under 35 U.S.C. § 112, First Paragraph**

Claims 20-53 have been rejected under 35 U.S.C. § 112, first paragraph for allegedly failing to comply with the enablement requirement. Specifically, the Examiner alleges that in claim 20, “means adaptively configuring one or more filters utilizing at ... arithmetic adaptation parameters” were not described in the specification to enable one skilled in the art to make and/or use the invention. The Examiner also alleges that the term “filter” was merely mentioned in the Background of the invention, but not in detail within the specification.

The Applicant respectfully disagrees. Nevertheless, to further prosecution, the Applicant has amended independent claims 20 and 37, and the affected dependent claims, to further clarify the claim language. In claim 20, the Applicant

submits that the amended claim language “utilizing at least a portion of said single set of complex number arithmetic adaptation parameters **for said DSP adaptive filtering** of said adaptation observations” is supported by the specification. For example, in addition to the background description, the term “adaptive filtering” is also mentioned in the “Summary Of The Invention”. Specifically, an “adaptive filter” is implemented by a programmable Digital Signal Processor (DSP) for communication application, as mentioned at pages 2, 3 and 8 of the present application. In addition, various embodiments of a DSP enabling “adaptive filtering” of adaptation observations for communication and control signals are both depicted and described in Figs. 2-6 of the present application.

Regarding claim 48, the Examiner alleges that the limitation “one or more processors” was not described in the specification in a detail way to enable one skilled in the art to make and/or use the invention. The Applicant respectfully disagrees and refers the Examiner to the “Summary Of The Invention” at page 2, which states: “An object of this invention is to **reduce the complexity in implementing an adaptive filter** (i.e., in a DSP) ... to **reduce the computational complexity...**”.

With regard to the implementation of adaptive filtering in a DSP, the Examiner is further referred to page 3 of the present application, which states that the advantages of this invention are: “Reducing the number of operations ... **on a programmable machine like a Digital Signal Processor (DSP)...**”. Specifically,

the various embodiments of implementing adaptive filtering in a DSP (i.e., the invention) are depicted and described in Figs. 2-6. In other words, the Applicant submits that the claimed language “one or more processors” of claim 48 finds support by the use of at least a **programmable machine like a Digital Signal Processor (DSP)**.

Based on the foregoing rationale, the Applicant respectfully requests that the rejection to claims 20-53 under 35 U.S.C. § 112, first paragraph be withdrawn.

### **III. Claim Rejections under 35 U.S.C. § 101**

Claims 20-53 have been rejected under 35 U.S.C. § 101 for allegedly being directed to non-statutory subject matter. Specifically, the Examiner alleges that claims 20-53 merely disclose series mental steps/components for performing operations ... without disclosing a physical application of the idea. In addition, the Examiner argues that claims 20-36 are considered as allegedly software per se, that the filtering process can be mathematical filtering and the final result is just a parameter.

The Applicant respectfully traverses this rejection. Nevertheless, in an effort to expedite prosecution, claims 20-29, 31, 37-44, 46 and 48 have been amended, as set forth above. The Applicant has amended independent claim 20 and 37 to now read “a **DSP** (Digital Signal Processor) that **enables adaptive**

**filtering of adaptation observations for communication and control signals**, wherein during the adaptive filtering, the DSP enables ...” The Examiner is referred to the Applicant’s arguments in section II above regarding support for the amendments.

In addition, the Applicant submits that the claimed **DSP**, which enables the **adaptive filtering** of adaptation observations for **communication and control signals**, is a tangible and a physical structure, such as a “**programmable machine**”. Likewise, the communication and control signals, which are adaptively filtered by the disclosed transforming functions, are useful functions performed by the DSP. In this regard, the transforming functions performed by the DSP are not mental steps, and are directed to statutory patentable subject matter. Therefore, the Applicant respectfully submits that the above argument overcomes the rejection under 35 U.S.C. § 101, and requests that this rejection be withdrawn.

#### **IV. REJECTION UNDER 35 U.S.C. § 103**

In order for a *prima facie* case of obviousness to be established, the Manual of Patent Examining Procedure, Rev. 6, Sep. 2007 (“MPEP”) states the following:

The key to supporting any rejection under 35 U.S.C. 103 is the clear articulation of the reason(s) why the claimed invention would have been obvious. The Supreme Court in *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385, 1396 (2007) noted that the analysis supporting a rejection under 35 U.S.C. 103 should be made explicit. The Federal Circuit has stated that “rejections on obviousness cannot be sustained with mere conclusory statements; instead, there

must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.”

See the MPEP at § 2142, citing *In re Kahn*, 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006), and *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d at 1396 (quoting Federal Circuit statement with approval). Further, MPEP § 2143.01 states that “the mere fact that references can be combined or modified does not render the resultant combination obvious unless the results would have been predictable to one of ordinary skill in the art” (citing *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385, 1396 (2007)). Additionally, if a *prima facie* case of obviousness is not established, the Applicant is under no obligation to submit evidence of nonobviousness:

The examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness. If the examiner does not produce a *prima facie* case, the applicant is under no obligation to submit evidence of nonobviousness.

See MPEP at § 2142.

**A. The Proposed Combination of Martin and AAPA Does Not Render Claims 20-53 Unpatentable**

The Applicant now turns to the rejection of claims 20-53 under 35 U.S.C. 103(a) as being unpatentable over Martin in view of AAPA (Fig. 1 of the present application).

**A(1). Rejection of Independent Claims 20 and 37 under 35 U.S.C. § 103 (a)**

With regard to the rejection of independent claim 20 under 35 U.S.C. § 103(a), the Applicant submits that the combination of Martin and the AAPA does not disclose or suggest at least the limitation of “**a DSP (Digital Signal Processor) that enables adaptive filtering of** adaptation observations for **communication and control signals,**” as recited in claim 20 by the Applicant.

The Applicant points out that Martin in the abstract in page 1232 discloses using “ESPRIT”, a signal estimation technique based on the translational invariance structure of **a sensor array** in a phase arrayed antenna (see Martin Fig. 1 in page1234), is unrelated to adaptive filtering in a DSP. In this regard, Martin neither discloses a DSP nor adaptive filtering of signals performed by a DSP. Likewise, AAPA does not overcome the above deficiency of Martin.

Therefore, the Applicant submits that the combination of Martin and APA does not suggest or disclose at least the limitation of “**a DSP (Digital Signal Processor) that enables adaptive filtering of** adaptation observations for **communication and control signals,**” as recited in claim 20 by the Applicant.

In addition, regarding the rejection of claim 20, the Applicant submits that the combination of Martin and the AAPA does not disclose or suggest at least the limitation of “**transforming** said adaptation observations **from a complex arithmetic to two corresponding sets of real number arithmetic observations** ...,” as recited in claim 20 by the Applicant.

In the Final Office Action, the Examiner alleges Martin discloses the following:

“means for transforming adaptation observations from a complex arithmetic to two sets of real number arithmetic observations by means of binary orthogonalization transformation (BOT) (e.g. page 1232 right column lines 3-17 which transforming/converting the complex matrices into a set of real matrices)”

See the Final Office Action at page 4 (with emphasis). Specifically, The Examiner relies for support on Martin, page 1232, which states:

Unitary ESPRIT effectively doubles the number of data samples, the computational complexity is reduced by **transforming the required** rank-revealing factorizations of **complex matrices** into decompositions of **real-valued matrices of the same size...**”

See Martin at page 1232, right column, lines 3-7 (with emphasis). The Examiner seems to equate Martin’s “**real-valued matrices** of the same size” to the Applicant’s claimed “**two corresponding sets of real number arithmetic observations**”.

The Applicant respectfully disagrees and points out that Martin discloses that the required complex matrices are transformed into “decompositions of real-valued matrices of the same size” using the method of “**Singular Value Decomposition**” (SVD), where a complex centro-Hermitian matrix  $M$  is decomposed into a real-valued matrix  $C^{p \times q}$  of the **same size** (i.e., a  $p \times q$  matrix, see Martin at page 1233, right column).

In other words, Martin discloses only a **one-to-one correspondence** in the complex matrix to real-valued matrix in the decomposition method, such that **for**



**each complex matrix, a singular real valued matrix of the same size is obtained.** In this regard, Martin does not disclose that the centro-Hermitian transformation obtains **two corresponding sets of real number arithmetic observations, from a complex arithmetic.** Likewise, AAPA does not overcome the above deficiency of Martin.

Based on this rationale, the Applicant maintains that the combination of Martin and AAPA does not disclose “**transforming** said adaptation observations **from a complex arithmetic to two corresponding sets of real number arithmetic observations ...**,” as recited in claim 20 by the Applicant.

In addition, with regard to the rejection of independent claim 20 under 35 U.S.C. § 103(a), the Applicant submits that the combination of Martin and AAPA does not disclose or suggest at least the limitation of “computing **two corresponding** sets of real number arithmetic adaptation parameters by **applying two respective** real number Least Square Solvers (**LESS**) to said **two corresponding sets of real number arithmetic observations**,” as recited by the Applicant in independent claim 20.

In the Final Office Action, the Examiner concedes the following:

“Martin et al. fail to explicitly spell-out the term LESS as a means for computing two sets of real number arithmetic adaptation parameters by applying two real number Least Square Solvers (LESS) to said two sets of real number arithmetic observations.”

See the Final Office Action at page 5. The Examiner relies for support on the Applicant's discussion of prior art (AAPA) in page 1 of the pending application and states the following:

“However, the admitted prior art discloses in page 1 a means for computing **two sets of real number** arithmetic adaptation parameters **by applying two real number Least Square Solvers (LESS) to said two sets of real number arithmetic observations** (e.g. last two paragraphs in page 1 wherein LESS is common and most widely used in solving such systems of linear equations).”

See the Final Office Action at page 5 (with emphasis). The Applicant, in the 8/7/08 response to Office Action, argued the fact that AAPA discloses solving only complex valued elements instead of solving real-valued elements. In response the Examiner at page 14 of the Final Office Action, argues that the “LESS concept seen in the AAPA is combined into the real matrices transformed by Martin in order to efficiently solving unknowns in linear system equations due to optimization of the LESS”. In other words, the Examiner disregards the fact that AAPA does not disclose that LESS is applied to real-valued elements, but to complex number parameters instead.

The Applicant respectfully disagrees. Nevertheless, even assuming for the sake of argument that the AAPA LESS discloses solving real-valued elements (which it does not), the combination of Martin and AAPA would disclose only half as many LESS for the required real-valued matrices. In other words, Martin discloses only a one-to-one (instead of a one-to-two) transformation of a complex centro-Hermitian matrix  $M$  into to a single real-valued matrix  $C^{p \times q}$  of the same size

(using SVD). Consequently, **Martin requires only half as many LESS** for the obtained real-valued matrix  $C^{p \times q}$  of the same size after transformation.

Therefore, based on the foregoing rationale, the Applicant maintains that the combination of Martin and AAPA does not disclose or suggest at least the limitation of “computing **two corresponding** sets of real number arithmetic adaptation parameters by **applying two respective** real number Least Square Solvers (**LESS**) to said **two corresponding sets of real number arithmetic observations**,” as recited by the Applicant in independent claim 20.

Moreover, with regard to the rejection of independent claim 20 under 35 U.S.C. § 103(a), the Applicant submits that the combination of Martin and AAPA does not disclose or suggest at least the limitation of “**transforming**, after said computing with said two respective LESS, **each of said two corresponding sets** of real adaptation parameters **to a single set of** complex number arithmetic adaptation parameters **using an inverse binary orthogonalization transform (IBOT)**,” as recited by the Applicant in independent claim 20.

In the Final Office Action, the Examiner alleges that Martin discloses the following:

“means for transforming said two sets of real adaptation parameters to a set of complex number arithmetic adaptation parameters using an inverse binary orthogonalization transform (IBOT) (e.g. **as reversed processed of BOT** above, page 1232 right column lines of first paragraph, and right column lines 8-10 page 1232),”

See the Final Office Action at pages 4-5 (with emphasis). The Examiner relies for support on Martin, specifically, Martin states:

“...This reduction can be achieved by constructing **invertible transformations** that map **centro-Hermitian matrices to real matrices**”

See Martin at page 1232, right column lines 8-10. The Examiner, at page 14 of the Final Office Action, argues that the term “invertible” means capable of backward or forward transformation. In other words, the Examiner alleges that the transformation process from a complex matrix  $M$  to a single real-valued matrix  $C^{p \times q}$  of the same size can be reversed back to a complex value matrix  $M$ .

Nevertheless, even assuming that Martin’s transformation is invertible, the Applicant points out that the Examiner’s argument is still deficient. Martin discloses a one-to-one correspondence (instead of one-to-two), i.e., a single complex matrix  $M$  is transformed to yield a single real-valued matrix  $C^{p \times q}$  by SVD. In this regard, Martin’s invertible transformation (i.e.,  $C^{p \times q}$  to  $M$ ) is still a one-to-one correspondence (instead of a two-to-one correspondence).

In this regard, Martin still does not disclose the limitation of “**transforming**, after said computing with said two respective LESS, **each of said two corresponding sets** of real adaptation parameters **to a single set** of complex number arithmetic adaptation parameters **using an inverse binary orthogonalization transform (IBOT)**,” as recited by the Applicant in independent claim 20. Likewise, AAPA does not overcome the above deficiency of Martin.

Furthermore, the Applicant has initially pointed out in the above argument that Martin discloses the “ESPRIT” is a signal estimation technique used on the phase array antenna sensors, Martin therefore does not disclose or suggest “utilizing at least a portion of **said single set of complex number arithmetic adaptation parameters for said DSP adaptive filtering** of said adaptation observations,” as recited by the Applicant in claim 20. Likewise, AAPA does not overcome the above deficiency of Martin.

Accordingly, based on the foregoing rationale, the Applicant maintains that the combination of Martin and AAPA does not establish a *prima facie* case of obviousness to reject claim 20. The Applicant respectfully requests that the rejection to claim 20 under 35 U.S.C. § 103(a) be withdrawn, and independent claim 20 should be allowable.

Likewise, independent claim 37 is similar in many respect to independent claim 20, and is also submitted to be allowable. The Applicant also reserves the right to argue additional reasons beyond those set forth above to support the allowability of claims 20 and 37.

#### **A(2). Rejection of Dependent Claims 21-36 and 38-53**

Based on at least the foregoing, the Applicant believes the rejection of independent claims 20 and 37 under 35 U.S.C. § 103(a) as being unpatentable over Martin in view of AAPA has been overcome and requests that the rejection be

withdrawn. Additionally, claims 21-36 and 38-53 depend directly or indirectly from respective independent claims 20 and 37, and are, consequently, also respectfully submitted to be allowable.

In addition, with regard to the rejection of claims 21 and 38, the Examiner takes an Office Notice to allege that operating an algorithm in parallel manner (i.e., two real numbers applied to LESS in parallel manner) is well-known in the art, and widely used in many practical application in the technology. At page 15 of the Final Office Action, the Examiner has cited additional references for support, namely, Gupta et al. (US Pub. No. 2007/0233765A1 hereinafter "Gupta") and Alexandru (US Pat. No. 6,704,438 hereinafter "Alexandru").

The Applicant has reviewed both the Gupta and Alexandru references, and points out that both of the cited references are unrelated to the LESS, let alone disclosing "two real numbers applied to LESS in parallel manner". For example, Gupta discloses "test generation for system verification using parallel algorithms", which does not disclose a LESS operation. Alexandru discloses using parallel processor to "improve signal to noise ratio on ultra sound images using coded waveform", which also does not disclose a LESS operation.

In this regard, the examiner has not overcome the argument that "two real numbers applied to LESS in parallel manner is well-known in the art," as alleged by the Examiner. The Applicant respectfully maintains that claim 21 is still allowable based on at least the following argument.

**A(2.1) Traversal Of Official Notice to Claims 21 and 38**

The Applicant traverses the Examiner's assertions that "operating two real numbers applied to LESS in parallel manner is well-known in the art, and widely used in many practical application in the technology" (page 6 of the Final Office Action). Because the combination of Martin and the admitted prior art clearly does not disclose or suggest "applying two real numbers to LESS in parallel manner", the Applicant can only assume that the Final Office Action is taking Official Notice of the subject matter disclosed in claim 21 and 38 regarding "applying two real numbers to LESS in parallel manner".

Additionally, the Applicant traverses the Examiner's assertions that after transforming complex variables using BOT, "applying two real numbers to LESS in parallel manner" is old and a well-known practice, and that it would have been obvious to a person skilled in the art at the time the invention was made to "apply two real numbers to LESS in parallel manner" in Martin (page 6 of the Final Office Action). Because the admitted prior art clearly does not disclose or suggest "applying two real numbers to LESS in parallel manner", the Applicant can only assume that the Final Office Action is taking Official Notice of the subject matter disclosed in claims 28 and 38 regarding "applying two real numbers to LESS in parallel manner" in the Applicant's invention.

Assuming the Final Office Action is asserting Official Notice that the subject of the above listed statements is common knowledge, the Applicant respectfully

traverses the perceived and explicit assertions as further set forth below. Alternatively, if the Final Office Action's assertions are based on the personal knowledge of the Examiner, then under MPEP § 2144.03(C) and 37 C.F.R. § 1.104(d)(2), the assertions must be supported by an affidavit from the Examiner.

According to MPEP § 2144.03(A), Official Notice, without supporting references, should only be asserted when the subjects asserted to be common knowledge are "capable of instant and unquestionable demonstration as being well-known." That is, the subjects asserted must be of "notorious character" under MPEP § 2144.03(A).

However, the Applicant respectfully submits that the subject matter of the perceived and explicit assertions of Official Notice, as stated in page 6 of the Final Office Action, are not well-known in the art as evidenced by the searched and cited prior art. The Applicant respectfully submits that the Examiner has performed "a thorough search of the prior art," as part of the Examiner's obligation in examining the present application under MPEP § 904.02.

Additionally, the Applicant respectfully submits that the Examiner's searched and cited references found during the Examiner's thorough and detailed search of the prior art are indicative of the knowledge commonly held in the art. However, in the Examiner's thorough and detailed search of the relevant prior art, none of the prior art taught or suggested the subject matter of the perceived and explicit assertions of Official Notice with regards to claims 21 and 38, as stated in



page 6 of the Final Office Action. That is, the Examiner's thorough and detailed search of the prior art has failed to yield any mention of the limitations in claims 21 and 38, which the Office Action concedes are not explicitly found in the combination of Martin and the admitted prior art, and which the Examiner asserts are widely known in the art. The Applicant respectfully submits that if the subject matter of these assertions of Official Notice had been of "notorious character" and "capable of instant and unquestionable demonstration as being well-known" under MPEP § 2144.03(A), then the subject matter would have appeared to the Examiner during the Examiner's thorough and detailed search of the prior art.

If the Examiner had found any teaching of relevant subject matter, the Examiner would have been obligated to list the references teaching the relevant subject matter and make a rejection. Consequently, the Applicant respectfully submits that the prior art does not teach the subject matter of the perceived assertions of Official Notice stated in page 6 of the Final Office Action and respectfully traverses the perceived assertions of Official Notice.

The Applicant specifically challenges the perceived and explicit assertions of Official Notice with regard to claims 21 and 38. As stated above, the Applicant respectfully traverses the perceived and explicit assertions of Official Notice and submits that the subject matter of claims 21 and 38 is not of such "notorious character" that it is "capable of instant and unquestionable demonstration as being well-known." Under MPEP 2144.03, the Examiner is now obligated to provide a

reference(s) in support of the perceived assertions of Official Notice if the Examiner intends to maintain any rejection based thereon. Additionally, the Applicant respectfully requests the Examiner reconsider the assertion of Official Notice and provide any basis for the assertions of Official Notice.

**A(2.2) Rejection to Claims 22, 31-34, 36, 39 and 48-53**

With regard to the rejection of claims 22 and 39, the Examiner has cited the AAPA in Fig. 1, where the LESS block 100 is applied in series, alleging that the LESS block 100 also discloses the Applicant's claimed "two real number LESS are applied in series". The Applicant points out that the LESS block 100 discloses a single input of complex-valued vector input in series, not "two real number applied in series". Therefore, claims 22 and 39 are submitted to be allowable.

In addition, with regard to the rejection of claims 31 and 48, the Examiner is referred to the similar argument in claim 20, that the combination of Martin and the AAPA does not disclose applying two real numbers to LESS (likewise to also CLESS). Therefore claims 31 and 48 are submitted to be allowable.

Additionally, claims 22, 31-34, 36, 39 and 48-53 depend directly or indirectly from respective independent claims 20 and 37, and are, consequently, also respectfully submitted to be allowable.

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Furthermore, the Applicant also reserves the right to argue additional reasons beyond those set forth above to support the allowability of claims 21-34, 36 and 38-53.

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### **CONCLUSION**

Based on at least the foregoing, the Applicant believes that all claims 20-34, 36-53 are in condition for allowance. If the Examiner disagrees, the Applicant respectfully requests a telephone interview, and request that the Examiner telephone the undersigned Patent Agent at (312) 775-8093.

The Commissioner is hereby authorized to charge any additional fees or credit any overpayment to the deposit account of McAndrews, Held & Malloy, Ltd., Account No. 13-0017.

A Notice of Allowability is courteously solicited.

Respectfully submitted,

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